REINFORCED CONCRETE BRIDGE APPROACHES

The Standard Specifications are revised as follows:

SECTION 609, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 609 – ~~Blank~~ *REINFORCED CONCRETE BRIDGE APPROACHES*

609.01 Description. *This work shall consist of constructing reinforced concrete bridge approaches, RCBA, on a prepared subgrade and subbase in accordance with 105.03.*

MATERIALS

609.02 Materials. *Materials shall be in accordance with the following:*

Coarse Aggregate, Class D or Higher, Size No. 53..... 904
*Concrete, Class C *..... 702*
Curing Materials..... 912.01
Joint Materials..... 906.02(a)1
Reinforcing Bars, Epoxy Coated..... 910.01
Support Devices..... 910.01(b)9
** Coarse Aggregate shall be Class AP, Size No. 8*

CONSTRUCTION REQUIREMENTS

609.03 General Requirements. *Subgrade shall be prepared in accordance with 207. Subbase shall be prepared in accordance with 302.*

609.04 Forms. *Forms shall be either steel or wood and shall be in accordance with 508.04(c)1 or 508.04(c)2.*

609.05 Joints. *Longitudinal construction joints will only be permitted as shown on the plans. The Type I-A joint will be constructed as shown on the plans.*

609.06 Reinforcing Bars. *Furnishing and placement of reinforcing bars shall be in accordance with 703.*

609.07 Thickness. *The depth of the RCBA will be checked by the Engineer prior to pouring, by making stringline measurements every 1 meter (3 feet) across the width of the approach. Any location deficient in depth by 13 mm (1/2 in.) or more shall be corrected prior to placing the concrete.*

609.08 Concrete Placement. *The subbase shall be uniformly moist at the time of concrete placement. Delivery and placement of concrete shall be in accordance with 702.*

609.9 Finishing. *The RCBA shall be finished with equipment in accordance with 508.04(c)3 and 508.04(c)4. The operations shall be controlled so that an excess of mortar and*

water is not worked to the top. Long handled floats may be used to smooth and fill in open textured areas. The edges of formed RCBA shall be tooled or chamfered.

The finished RCBA surface shall be textured with a double thickness burlap drag or a minimum 1.2 m (4 ft) wide turf drag. Immediately after the finishing operation is complete and before the surface film has formed, the surface of the RCBA shall be textured by transverse grooving in accordance with 504.03. The grooves may be formed by mechanized equipment using a vibrating beam roller, a series of discs or other approved device. Manual tools such as fluted floats, spring steel tined rakes, or finned floats with a single row of fins may be used. The grooves shall be relatively uniform and smooth and shall be formed without tearing the surface or bringing coarse aggregate to the top.

All areas of hardened RCBA which do not conform to the requirements due to either a deficiency in the grooving or a rough open textured surface shall be corrected. Corrections shall be made by cutting transverse grooves in the hardened surface with an approved cutting machine and retexturing to a satisfactory finish as directed.

609.10 Curing. *RCBA shall be wet cured in accordance with 702 or shall have liquid membrane forming curing compound applied to exposed surfaces within 30 min after the finishing operations have been completed. The edges of the RCBA shall be cured immediately upon removal of the forms. The edge shall be covered with curing materials equal to the material used on the surface or banked with soil 300 mm (12 in.) wide or greater.*

When conditions arise which prevent timely application of curing materials the surfaces shall be kept wet with a fine spray of water. The fine spray of water shall continue until application of curing materials is resumed.

Liquid membrane forming curing compound shall be applied in a continuous uniform film at a rate not less than 1 L/3.7 m^2 (1 gal./150 ft^2). Additional applications, if needed, shall follow the previous application within 30 min. The curing compound may be warmed in a water bath during cold weather at a temperature not exceeding 38°C (100°F). Thinning with solvents will not be permitted. Non-uniform film rates will result in the discontinuance of that application method.

A new coat of curing compound shall be applied to areas damaged by rain or other means during the curing period. The recoating shall be applied as soon as possible and at a rate equal to that specified for the original coat.

609.11 Smoothness. *The smoothness of the surface of the RCBA will be measured by means of a 3 m (10 ft) long straightedge as soon as practical following curing or completion of adjoining roadway or structure sections. All surface variations shall be corrected to 3 mm (1/8 in.) or less.*

Smoothness variations outside specified tolerances shall be corrected in accordance with 502.20.

609.12 Opening to Traffic. *RCBA may be opened to traffic after 14 days. The RCBA may be opened earlier if test beams indicate a modulus of rupture of 3800 kPa (550 psi) or greater.*

The Contractor and Engineer will conduct an inspection of the new RCBA for any damage. The inspection and all necessary repairs shall be completed prior to opening to traffic.

609.13 Method of Measurement. *Reinforced concrete bridge approaches will be measured by the square meter (square yard). Dense graded subbase will be measured in accordance with 302.08. Reinforcing bars will be measured in accordance with 703.07.*

Subgrade preparation will not be measured for payment. Finishing and curing of the RCBA will not be measured for payment. Construction joints will not be measured.

609.14 Basis of Payment. *Reinforced concrete bridge approaches will be paid for at the contract unit price per square meter (square yard). Dense graded subbase will be paid for in accordance with 302.09. Reinforcing bars will be paid for in accordance with 703.08.*

Payment will be made under:

Pay Item	*Metric Pay Unit Symbol (English Pay Unit Symbol)*
Reinforced Concrete Bridge Approach, _____ thickness	*mm (in.)……m2 (SYS)*

The cost of all materials, water, equipment, and all labor for the compaction of the subgrade, shall be included in the cost of the RCBA.

The cost of finishing, furnishing and placing curing materials shall be included in the cost of the RCBA.

The cost of corrections for smoothness or re-texturing shall be included in the cost of RCBA.

The cost of all labor and materials for the placement of construction joints shall be included in the cost of the RCBA.

SECTION 906, BEGIN LINE 191, DELETE AND INSERT AS FOLLOWS:

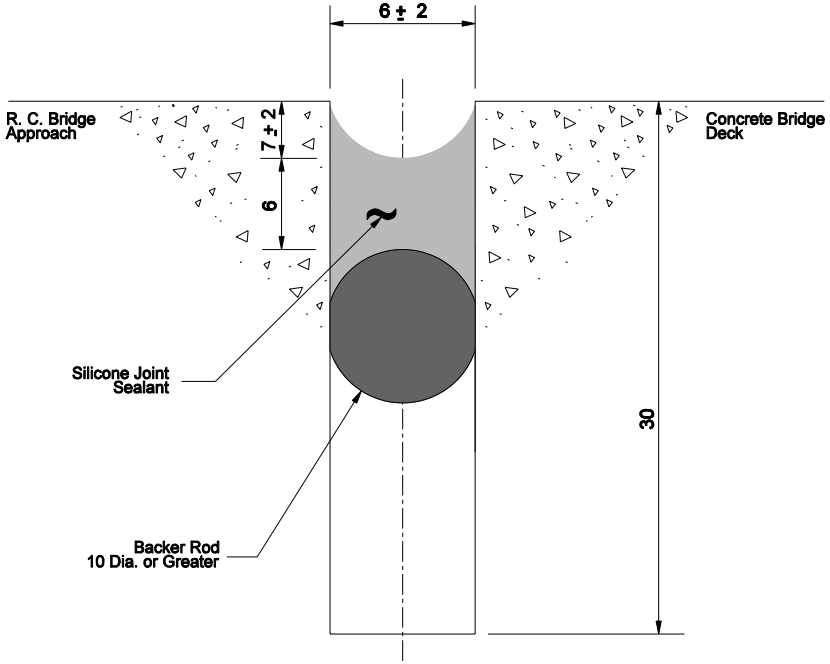
(b) Type BS2, BS6, BS8, BS9, *and* BS11~~, and 1-A~~. Materials shall be in accordance with ASTM D 3542. The dimension and tolerance requirements shall be as specified in the following table for the type or types of joints specified.

Item No. 39-2 Cont.
Mr. Miller
Date: 2/13/03

REVISION TO 1999 STANDARD SPECIFICATIONS

SECTION 906, CONTINUED.

EXPANSION JOINT TYPE	SEAL WIDTH	SEAL HEIGHT	JOINT WIDTH @ INSTALLATION
BS2	41 mm (1 5/8 in.) ± 3 mm (± 1/8 in.)	41 mm (1 5/8 in.) ± 3 mm (± 1/8 in.)	22 mm (7/8 in.) + 3 mm, - 6 mm (+ 1/8 in., - 1/4 in.)
BS6	64 mm (2 1/2 in.) - 0, + 6 mm (- 0, + 1/4 in.)	64 mm (2 1/2 in.) + 10 mm, - 3 mm (+ 3/8, - 1/8 in.)	38 mm (1 1/2 in.) + 3 mm, - 6 mm (+ 1/8 in., - 1/4 in.)
BS8	76 mm (3 in.) - 0, + 6 mm (- 0, + 1/4 in.)	83 mm (3 1/4 in.) ± 6 mm (± 1/4 in.)	48 mm (1 7/8 in.) + 3 mm, - 6 mm (+ 1/8 in., 1/4 in.)
BS9	100 mm (4 in.) - 0, + 6 mm (- 0, + 1/4 in.)	111 mm (4 3/8 in.) ± 10 mm (± 3/8 in.)	64 mm (2 1/2 in.) + 3 mm, - 6 mm (+ 1/8 in., - 1/4 in.)
BS11	127 mm (5 in.) - 0, + 6 mm (- 0, + 1/4 in.)	128 mm (5 1/8 in.) ± 6 mm (± 1/4 in.)	75 mm (3 in.) + 3 mm, - 6 mm (+ 1/8 in., - 1/4 in.)
~~1 A~~	~~16 mm~~ ~~(5/8 in.)~~ ~~± 2 mm~~ ~~(± 1/16 in.)~~	~~17 mm~~ ~~(11/16 in.)~~ ~~± 3 mm~~ ~~(± 1/8 in.)~~	~~6 mm~~ ~~(1/4 in.)~~ ~~- 0, + 3 mm~~ ~~(- 0, + 1/8 in.)~~



NOTES

1. See Standard Drawing 609-RCBA-07 for joint location

All Dimension are in mm unless otherwise specfied

INDIANA DEPARTMENT OF TRANSPORTATION

TYPE 1-A JOINT

609-BRJT-01

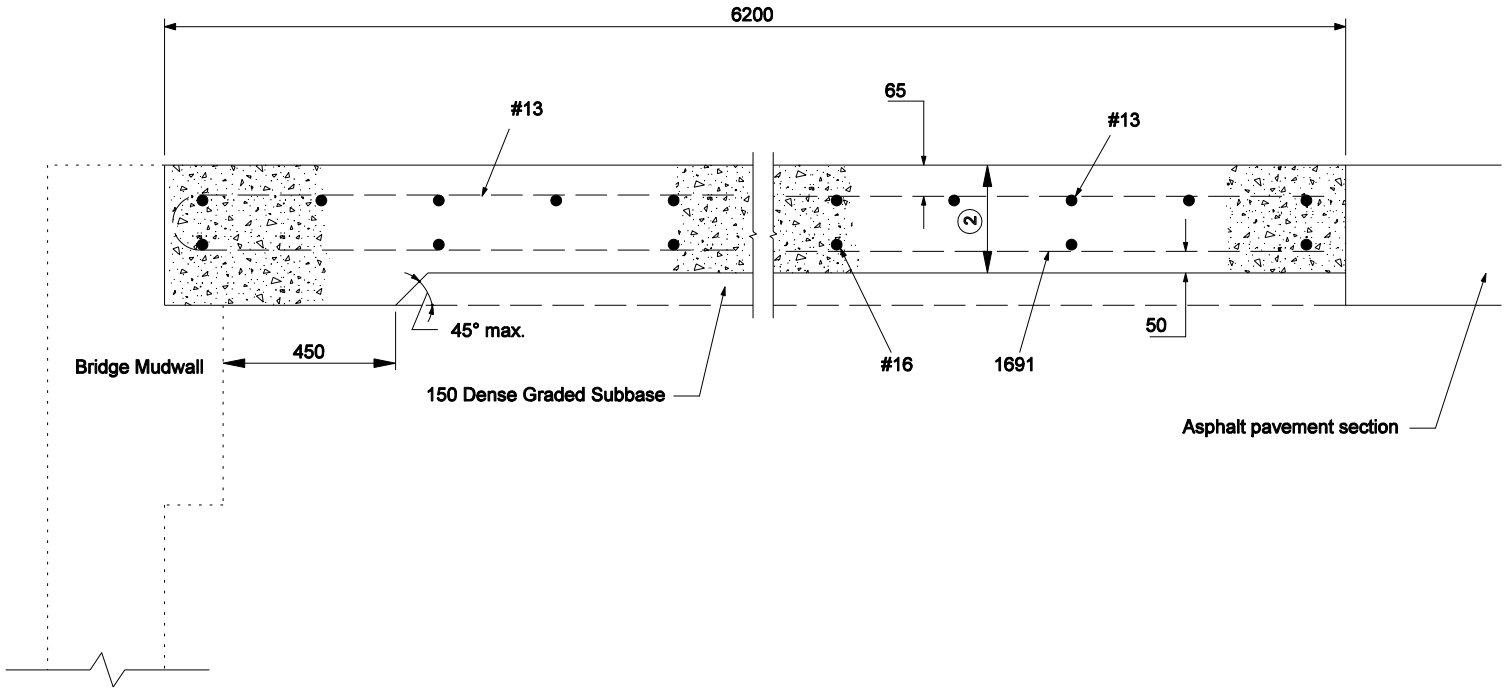
609-RCBA-01

NOTES

1. For reinforcement details, see Standard Drawing 609-RCBA-03 for square RCBAs and Standard Drawing 609-RCBA-04 for skewed RCBAs.

2. 250 if design year AADT < 1000
   300 if design year AADT ≥ 1000

3. All reinforcing bars shall be epoxy coated.

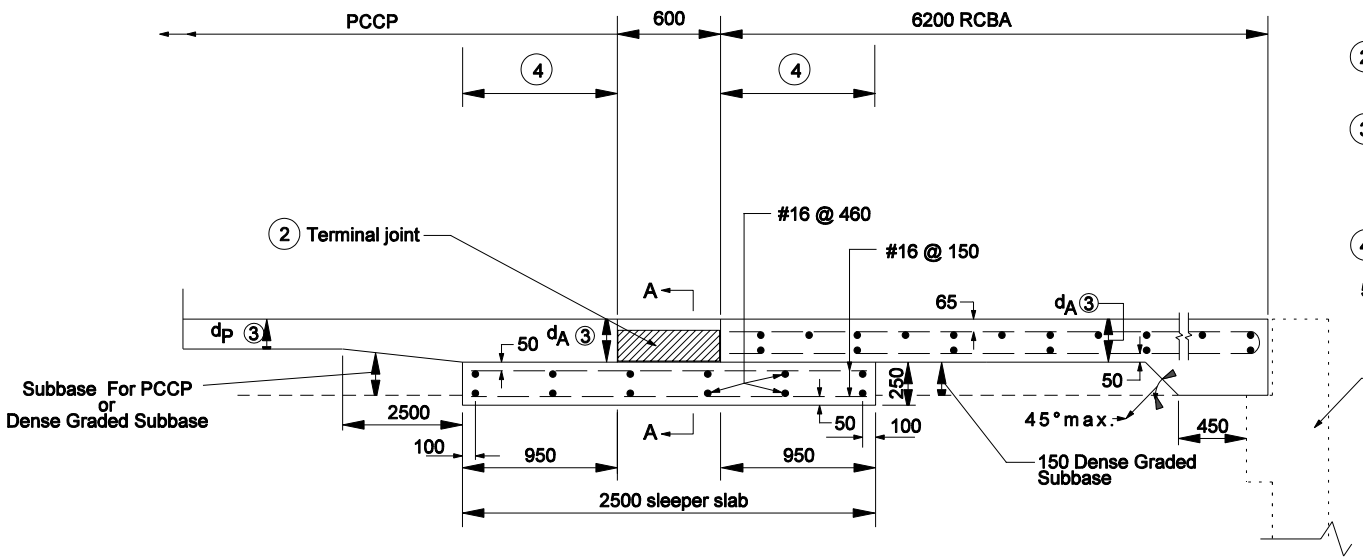


All Dimension are in mm unless otherwise specfied

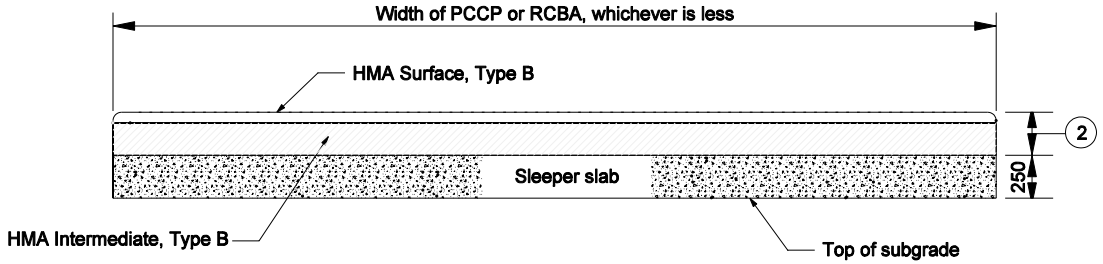
INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH FOR USE WITH ASPHALT PVMT.

6069-RCBA-02



TERMINAL JOINT FOR PCCP AT BRIDGE STRUCTURE



SECTION A-A

GENERAL NOTES

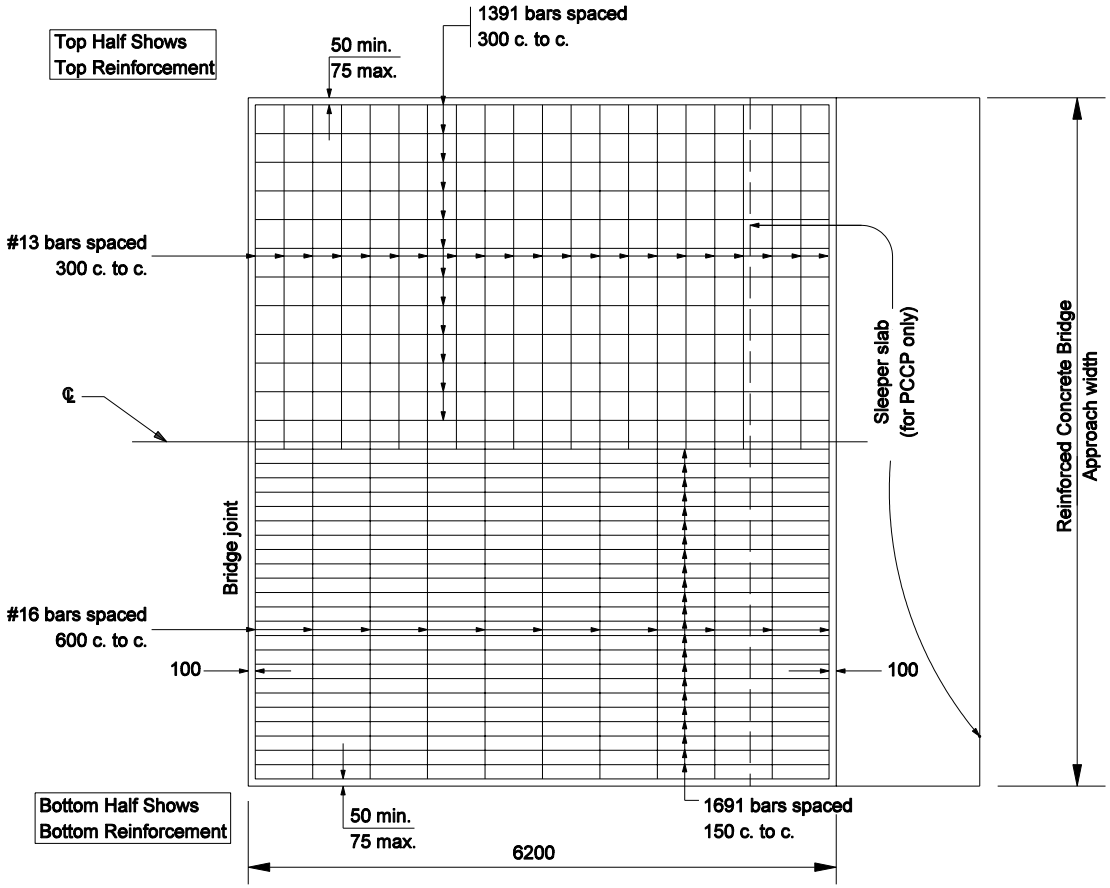
1. For reinforcement details, see Standard Drawing 609-RCBA-03 for square RCBAs and Standard Drawing 609-RCBA-04 for skewed RCBAs.
2. Terminal joint elevation shall match elevation of adjacent PCCP and RCBA.
3. Depth d_A must equal d_P. However, if d_P s less than 300, d_A must be 300.
4. Limits of polyethylene bond breaker.
5. All reinforcing bars in the reinforced concrete bridge approach shall be epoxy coated.

All Dimension are in mm unless otherwise specfied

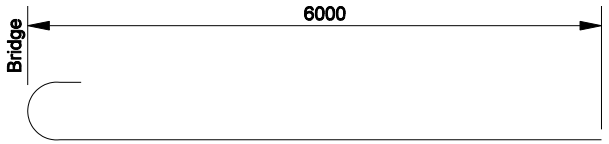
INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH AND TERMINAL JOINT FOR USE WITH PCCP

609-RCBA-03



REINFORCEMENT DETAIL FOR SQUARE APPROACH



1391 x 6160
1691 x 6180

NOTE

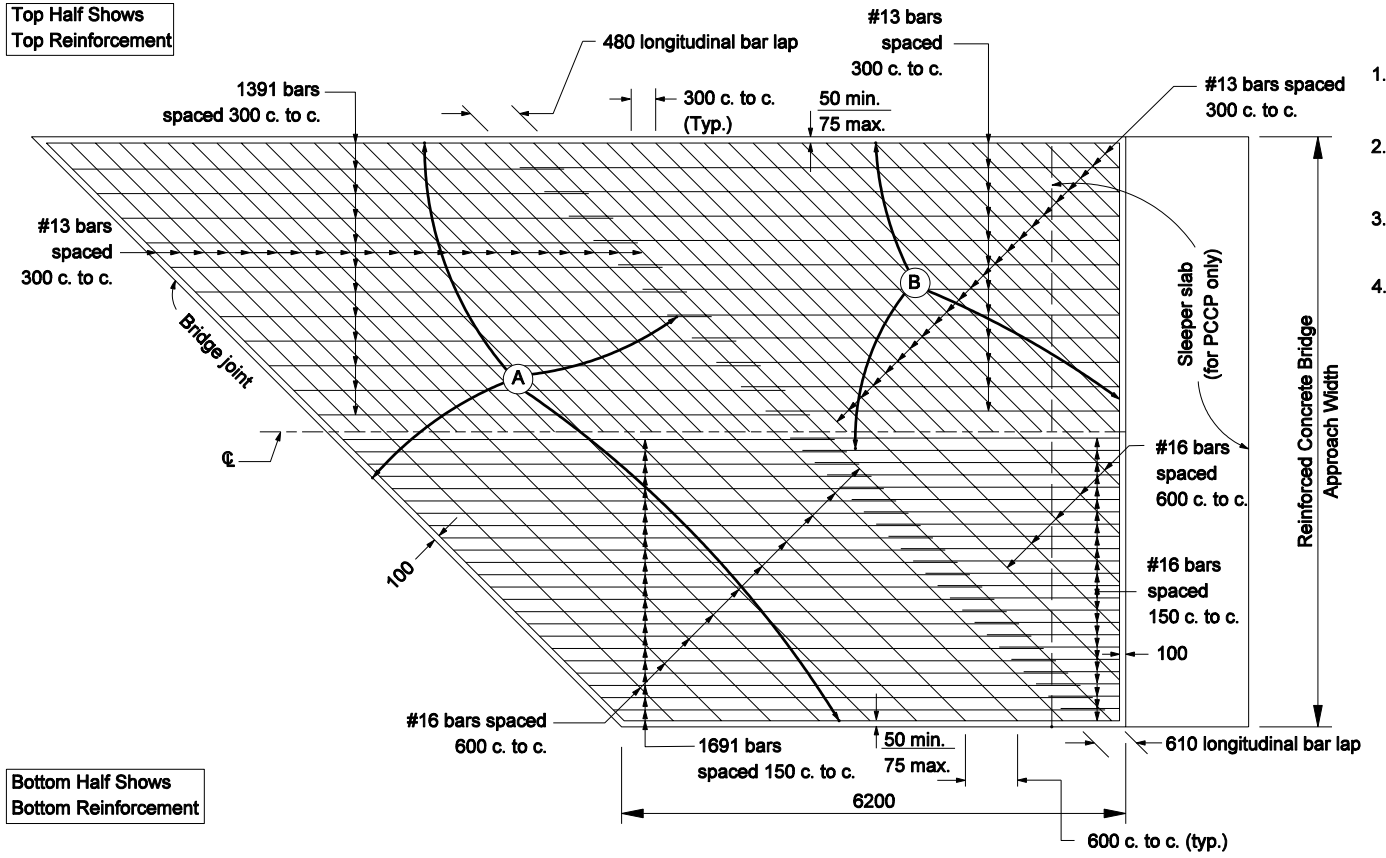
1. See Standard Drawing 609-RCBA-05 for Bill of Materials.
2. All reinforcing bars shall be epoxy coated.

All Dimension are in mm unless otherwise specfied

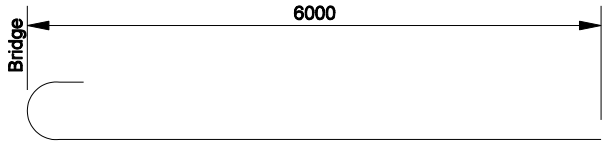
INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH

609-RCBA-04



REINFORCEMENT DETAIL FOR SKEWED APPROACH



1391 x 6260
1691 x 6280

NOTES

1. Area Ⓐ includes all bars of equal length.
2. Area Ⓑ includes all bars of unequal length.
3. See Standard Drawing 609-RCBA-06 for Bill of Materials.
4. All reinforcing bars shall be epoxy coated.

All Dimension are in mm unless otherwise specfied

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH

609-RCBA-05

BILL OF MATERIALS

SQUARE STRUCTURES - ONE SLAB

BRIDGE APPROACH WIDTH	EPOXY COATED REINFORCING BARS				TOTAL MASS, kg	REINFORCED CONCRETE BRIDGE APPROACH AREA m^2
	LONGIT. BARS		TRANSV. BARS			
	NO.	SIZE x LGTH. OR MARK	NO.	SIZE x LGTH.		
7200	24	1391	21	#13 x 7100	877	44.6
	48	1691	11	#16 x 7100		
7600	26	1391	21	#13 x 7500	933	47.1
	51	1691	11	#16 x 7500		
7800	26	1391	21	#13 x 7700	947	48.4
	52	1691	11	#16 x 7700		
8200	28	1391	21	#13 x 8100	1006	50.8
	55	1691	11	#16 x 8100		
8800	30	1391	21	#13 x 8700	1080	54.6
	59	1691	11	#16 x 8700		
9400	32	1391	21	#13 x 9300	1153	58.3
	63	1691	11	#16 x 9300		
10000	34	1391	21	#13 x 9900	1226	62.0
	67	1691	11	#16 x 9900		
10600	36	1391	21	#13 x 10500	1300	65.7
	71	1691	11	#16 x 10500		
11200	38	1391	21	#13 x 11100	1373	69.4
	75	1691	11	#16 x 11100		
11800	40	1391	21	#13 x 11700	1447	73.2
	79	1691	11	#16 x 11700		
12100	41	1391	21	#13 x 12000	1483	75.0
	81	1691	11	#16 x 12000		
12400	42	1391	42	#13 x 6400 *	1542	76.9
	83	1691	22	#16 x 6500 **		
13600	46	1391	42	#13 x 7000 *	1659	84.3
	91	1691	22	#16 x 7100 **		

* Bars lapped 480 at centerline of roadway. ** Bars lapped 610 at centerline of roadway.

NOTES

1. The Bill of Materials shall be used to determine the bar lengths, total mass of steel, and bridge approach area for square structures.

2. For details, see Standard Drawing 609-RCBA-03.

All Dimension are in mm unless otherwise specfied

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH

609-RCBA-06

BILL OF MATERIALS
SKEWED STRUCTURES - ONE SLAB

BRIDGE APPROACH WIDTH	EPOXY COATED REINFORCING BARS			
	LONGIT. BARS, AREA (A)		TRANSV. BARS. AREA (A)	
	NO.	SIZE x LGTH. OR MARK	NO.	SIZE
7200	24	1391	21	#13
	48	1691	11	#16
7600	26	1391	21	#13
	51	1691	11	#16
7800	26	1391	21	#13
	52	1691	11	#16
8200	28	1391	21	#13
	55	1691	11	#16
8800	30	1391	21	#13
	59	1691	11	#16
9400	32	1391	21	#13
	63	1691	11	#16
10000	34	1391	21	#13
	67	1691	11	#16
10600	36	1391	21	#13
	71	1691	11	#16
11200	38	1391	21	#13
	75	1691	11	#16
11800	40	1391	21	#13
	79	1691	11	#16
12100	41	1391	21	#13
	81	1691	11	#16
12400	42	1391	42	#13 *
	83	1691	22	#16 **
13600	46	1391	42	#13 *
	91	1691	22	#16 **

* Bars lapped 480 at centerline of roadway if bar exceeds 12000.
** Bars lapped 610 at centerline of roadway if bar exceeds 12000.

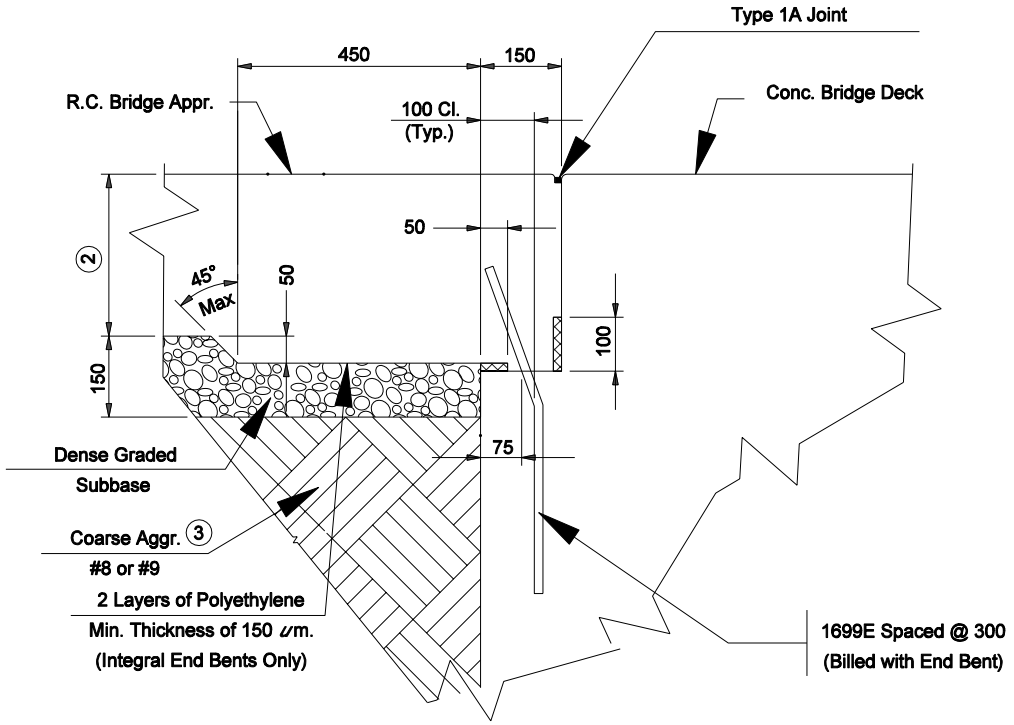
NOTES

1. The Bill of Materials shall be used to determine the longitudinal bar requirements in Area (A) shown on Standard Drawing 609-RCBA-04 for skewed structures.
2. See the plans for longitudinal bars required in Area (B), all transverse bars, total mass of steel and bridge approach area for skewed structures.
3. All reinforcing bars shall be epoxy coated.

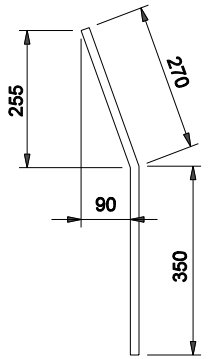
All Dimension are in mm unless otherwise specfied

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH



PAVEMENT LEDGE DETAIL



1699E x 620

609-RCBA-07

NOTES:

1. See Standard Drawing 609-BRJT-01 for Type 1A joint details.

② 250 if design year AADT< 1000
300 if design year AADT ≥ 1000
or match thickness of concrete approach pavement if thicker than 300

③ Flowable backfill if slab bridge.

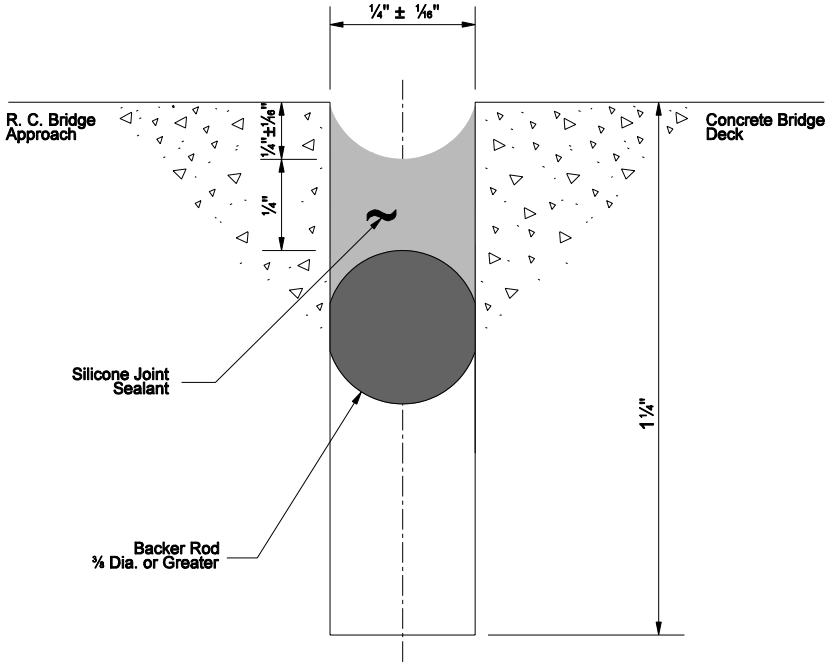
LEGEND

13 mm Expanded Polystyrene

All Dimension are in mm unless otherwise specfied

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH
PAVEMENT LEDGE DETAIL



NOTES

1. See Standard Drawing E-609-RCBA-07 for joint location

INDIANA DEPARTMENT OF TRANSPORTATION

TYPE 1-A JOINT

E 609-BRJT-01

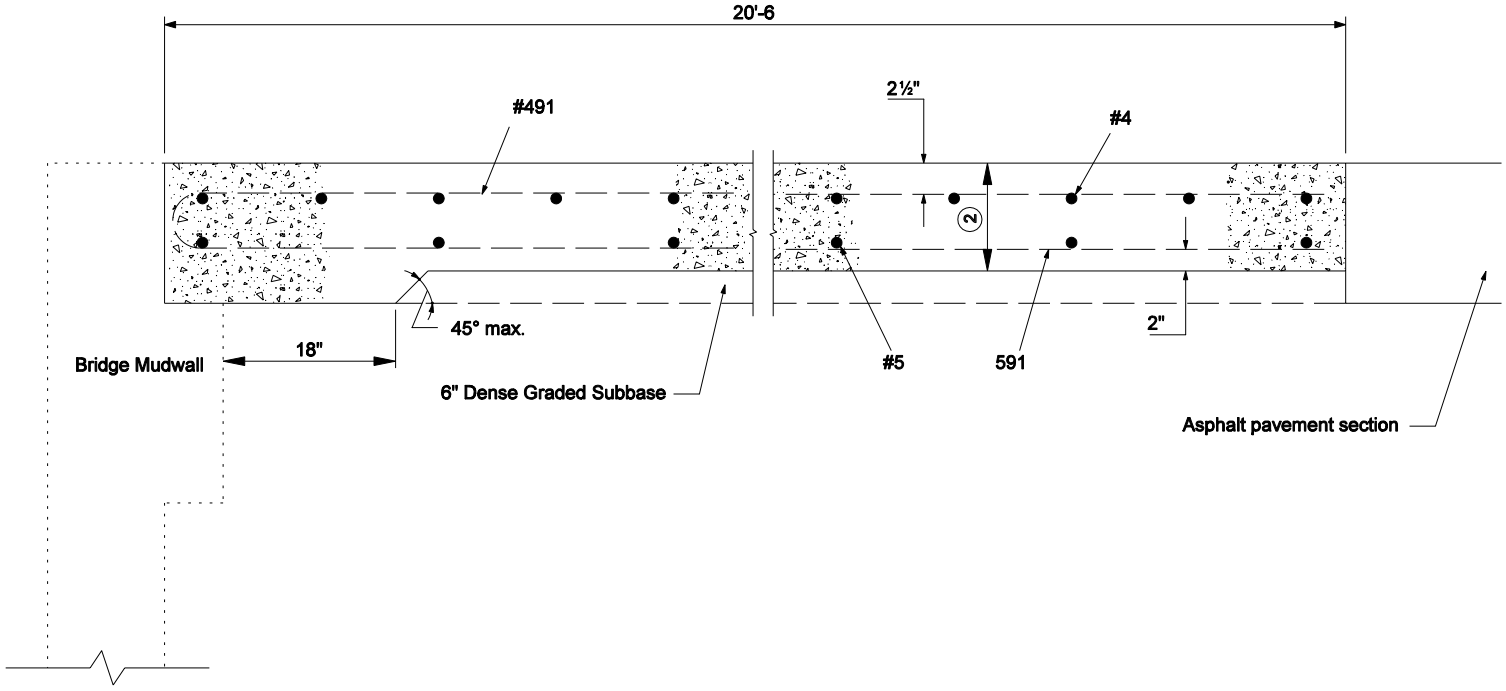
E 609-RCBA-01

NOTES

1. For reinforcement details, see Standard Drawing E 609-RCBA-03 for square RCBAs and Standard Drawing E 609-RCBA-04 for skewed RCBAs.

2. 10" if design year AADT < 1000
   12" if design year AADT ≥ 1000

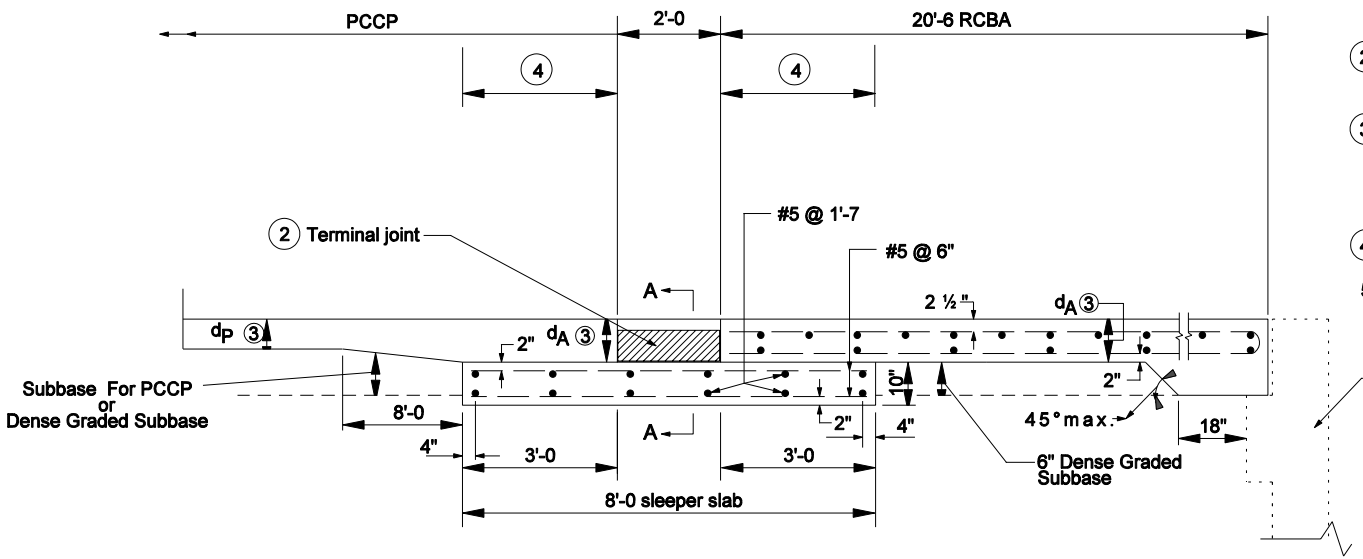
3. All reinforcing bars shall be epoxy coated.



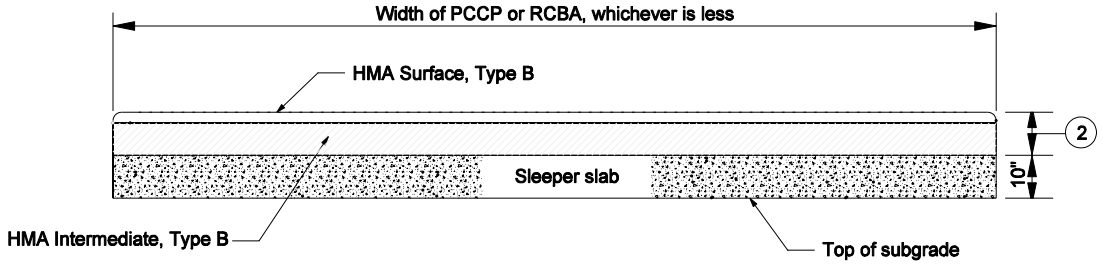
INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH FOR USE WITH ASPHALT PVMT.

E 609-RCBA-02



TERMINAL JOINT FOR PCCP AT BRIDGE STRUCTURE



SECTION A-A

GENERAL NOTES

1. For reinforcement details, see Standard Drawing 609-RCBA-03 for square RCBAs and Standard Drawing 609-RCBA-04 for skewed RCBAs.

(2) Terminal joint elevation shall match elevation of adjacent PCCP and RCBA.

(3) Depth d_A must equal d_P. However, if d_P s less than 12 in., d_A must be 12 in.

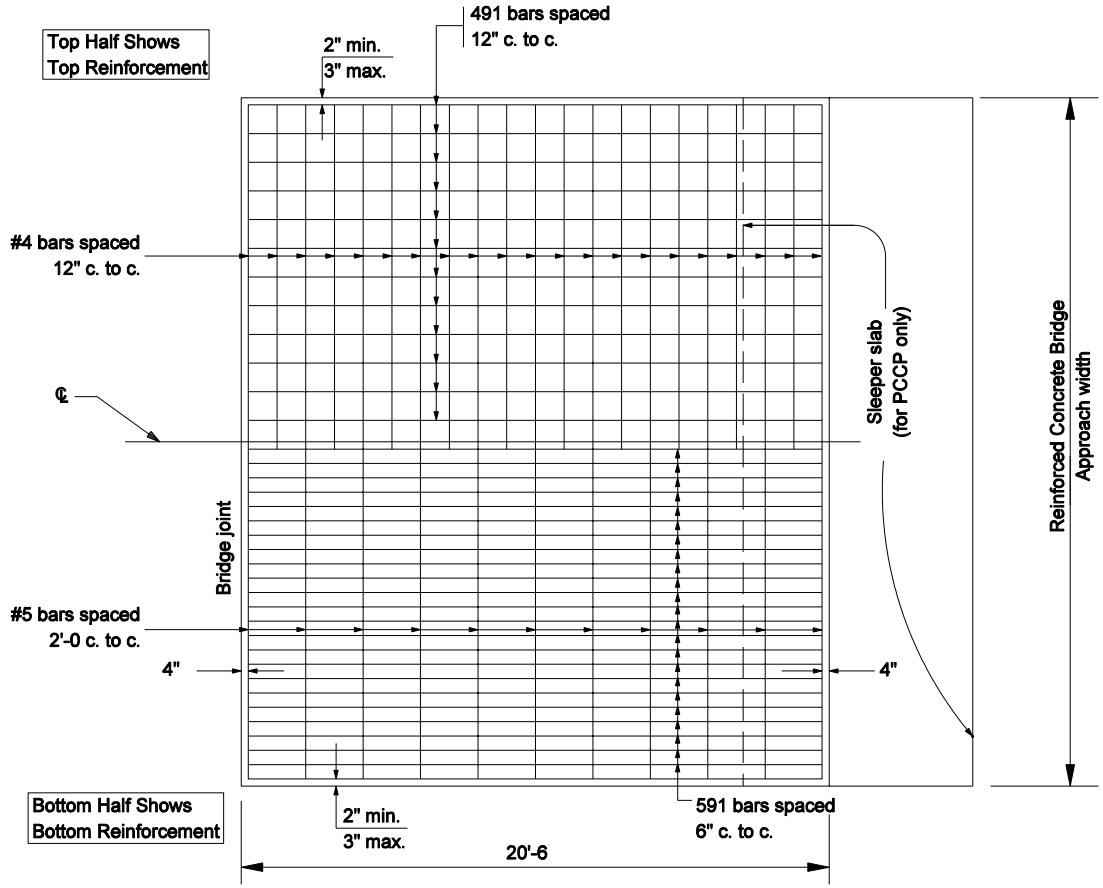
(4) Limits of polyethylene bond breaker.

5. All reinforcing bars in the reinforced concrete bridge approach shall be epoxy coated.

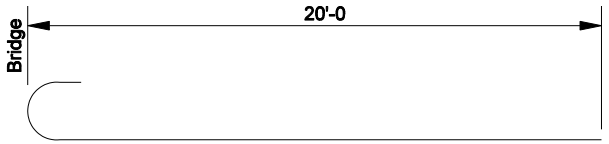
REINFORCED CONCRETE BRIDGE APPROACH AND TERMINAL JOINT

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH AND TERMINAL JOINT FOR USE WITH PCCP



REINFORCEMENT DETAIL FOR SQUARE APPROACH



491 X 20'-6
591 x 20'-7

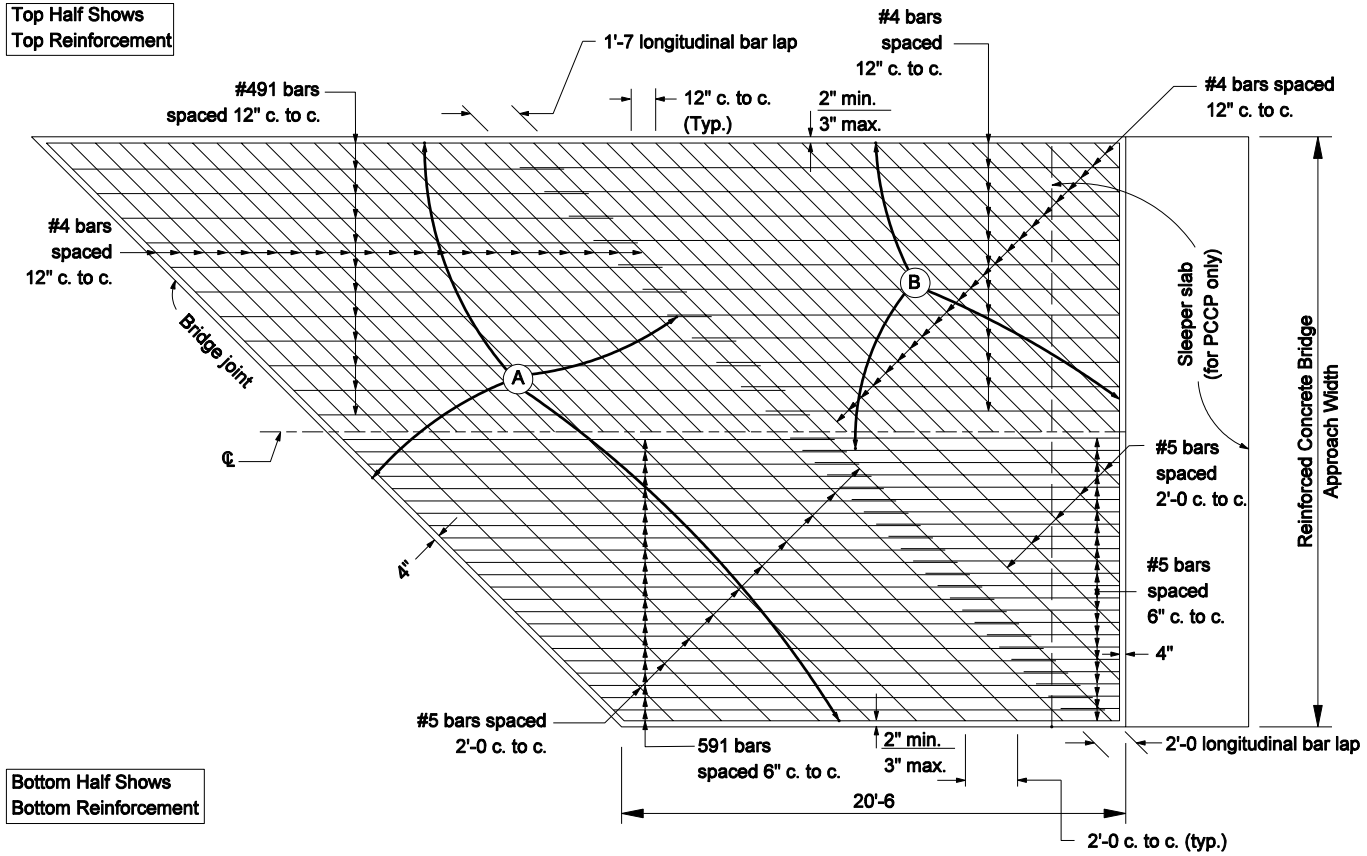
NOTE

1. See Standard Drawing E 609-RCBA-05 for Bill of Materials.
2. All reinforcing bars shall be epoxy coated.

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH

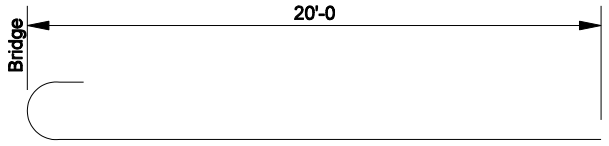
E 609-RCBA-03



NOTES

1. Area Ⓐ includes all bars of equal length.
2. Area Ⓑ includes all bars of unequal length.
3. See Standard Drawing E 609-RCBA-06 for Bill of Materials.
4. All reinforcing bars shall be epoxy coated.

REINFORCEMENT DETAIL FOR SKEWED APPROACH



591 x 20'-7
491 x 20'-6

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE
BRIDGE APPROACH

E 609-RCBA-04

E 609-RCBA-05

BILL OF MATERIALS

SQUARE STRUCTURES - ONE SLAB

BRIDGE APPROACH WIDTH	EPOXY COATED REINFORCING BARS				TOTAL WEIGHT LBS.	REINFORCED CONCRETE BRIDGE APPROACH AREA SQ. YDS.
	LONGIT. BARS		TRANSV. BARS			
	NO.	SIZE x LGTH. OR MARK	NO.	SIZE x LGTH.		
24'-0	24	491	21	#4 x 23'-6	1958	54.7
	8	591	11	#5 x 23'-6		
25'-0	26	491	21	#4 x 24'-6	2076	56.9
	51	591	11	#5 x 24'-6		
25'-6	26	491	21	#4 x 25'-0	2110	58.1
	52	591	11	#5 x 25'-0		
27'-0	28	491	21	#4 x 26'-6	2240	61.5
	55	591	11	#5 x 26'-6		
29'-0	30	491	21	#4 x 28'-6	2404	66.1
	59	591	11	#5 x 28'-6		
31'-0	32	491	21	#4 x 30'-6	2568	70.6
	63	591	11	#5 x 30'-6		
33'-0	34	491	21	#4 x 32'-6	2733	75.2
	67	591	11	#5 x 32'-6		
35'-0	36	491	21	#4 x 34'-6	2897	79.7
	71	591	11	#5 x 34'-6		
37'-0	38	491	21	#4 x 36'-6	3061	84.3
	75	591	11	#5 x 36'-6		
39'-0	40	491	21	#4 x 38'-6	3225	88.8
	79	591	11	#5 x 38'-6		
40'-0	41	491	21	#4 x 39'-6	3307	91.1
	81	591	11	#5 x 39'-6		
42'-0	42	491	42	#4 x 21'-9 *	3466	95.7
	83	591	22	#5 x 21'-9 **		
44'-0	46	491	42	#4 x 22'-9 *	3744	100.2
	91	591	22	#5 x 22'-9 **		

* Bars lapped 1'-7 at centerline of roadway. ** Bars lapped 2'-0 at centerline of roadway.

NOTES

1. The Bill of Materials shall be used to determine the bar lengths, total mass of steel, and bridge approach area for square structures.

2. For details, see Standard Drawing E 609-RCBA-03.

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH

E 609-RCBA-06

BILL OF MATERIALS
SKEWED STRUCTURES - ONE SLAB

BRIDGE APPROACH WIDTH	EPOXY COATED REINFORCING BARS			
	LONGIT. BARS, AREA (A)		TRANSV. BARS. AREA (A)	
	NO.	SIZE x LGTH. OR MARK	NO.	SIZE
24'-0	24	491	21	#4
	48	591	11	#5
25'-0	26	491	21	#4
	51	591	11	#5
25'-0	26	491	21	#4
	52	591	11	#5
27'-0	28	491	21	#4
	55	591	11	#5
29'-0	30	491	21	#4
	59	591	11	#5
31'-0	32	491	21	#4
	63	591	11	#5
33'-0	34	491	21	#4
	67	591	11	#5
35'-0	36	491	21	#4
	71	591	11	#5
37'-0	38	491	21	#4
	75	591	11	#5
39'-0	40	491	21	#4
	79	591	11	#5
40'-0	41	491	21	#4
	81	591	11	#5
42'-0	42	491	42	#4 *
	83	591	22	#5 **
44'-0	46	491	42	#4 *
	91	591	22	#5 **

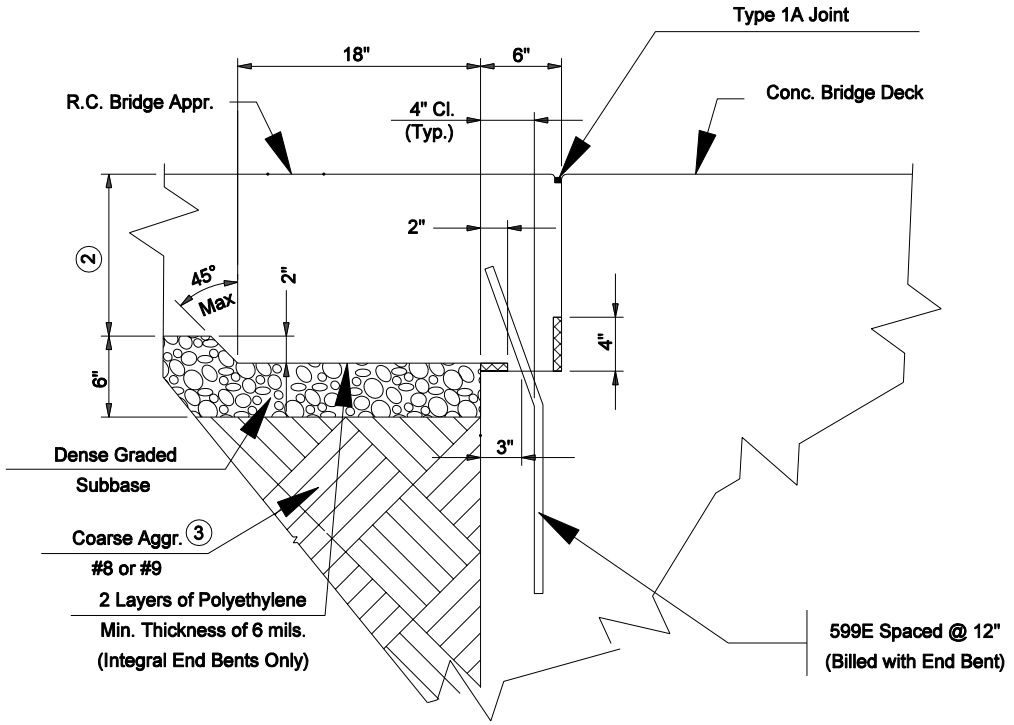
* Bars lapped 1'-7 at centerline of roadway if bar exceeds 40'-0.
** Bars lapped 2'-0 at centerline of roadway if bar exceeds 40'-0.

NOTES

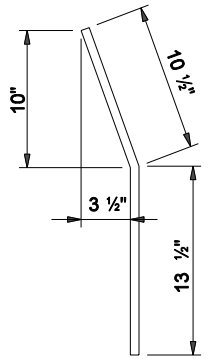
1. The Bill of Materials shall be used to determine the longitudinal bar requirements in Area (A) shown on Standard Drawing E 609-RCBA-04 for skewed structures.
2. See the plans for longitudinal bars required in Area (B), all transverse bars, total mass of steel and bridge approach area for skewed structures.
3. All reinforcing bars shall be epoxy coated.

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH



PAVEMENT LEDGE DETAIL



599E x 2'-0"

NOTES:

1. See Standard Drawing E-609-BRJT-01 for Type 1A joint details.

② 10" if design year AADT< 1000
12" if design year AADT ≥ 1000
or match thickness of concrete approach pavement if thicker than 12"

③ Flowable backfill if slab bridge.

LEGEND

13 mm Expanded Polystyrene

INDIANA DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE BRIDGE APPROACH
PAVEMENT LEDGE DETAIL

E 609-RCBA-07